

MAXIMUM EXTENDED LOAD LINE LIMIT ANALYSIS FOR A BOILING WATER NUCLEAR REACTOR

ABSTRACT OF THE DISCLOSURE

A method for expanding the operating domain of a boiling water nuclear reactor that permits safe operation of the reactor at low core flows is described. The operating domain is characterized by a map of the reactor thermal power and core flow. In an exemplary embodiment, the method for expanding the operating domain of a boiling water nuclear reactor permits operation of the reactor between about 120 percent of rated thermal power and about 85 percent of rated core flow to about 100 percent of rated thermal power and about 55 percent of rated core flow. The method includes determining an elevated load line characteristic that improves reactor performance, performing safety evaluations at the elevated load line to determine compliance with safety design parameters, and performing operational evaluations at the elevated load line. The method also includes defining a set of operating conditions for the reactor in an upper operating domain characterized by the elevated load line. Additionally, the method includes performing a detailed analysis of the performance of the core recirculation system and the system control components. further, the method provides for modifying the reactor process controls and computers to permit the reactor to operate in the expanded operating domain within predetermined safety parameters. Also, safety mitigation action setpoints are adjusted to permit reactor operation in the expanded operating domain.